Abstract Submitted
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Investigation of the effect of the spanwise forcing on vortex shedding suppression in the flow past a cylinder[1] GABRIELE ROCCO, SPENCER SHERWIN, Imperial College London — Controlling the wake vortex dynamics of bluff bodies efficiently is a fundamental problem in many applications. Earlier direct numerical simulations (Darekar, Sherwin, 2001) of three-dimensional bluff bodies have demonstrated that the introduction of a spanwise waviness at both the leading and trailing surfaces suppresses the vortex shedding and reduces the amplitude of the fluctuating aerodynamic forces. Under this motivation, direct numerical simulations and stability analysis of the flow past a three-dimensional cylinder in the supercritical regime were performed. Starting from a fully developed shedding, a sufficiently high spanwise forcing is introduced on the surface of the cylinder, in the regions where separation effects occur, resulting in the stabilisation of the near wake in a time-independent state. Numerical experiments were conducted to detect the critical values of the amplitude of the forcing capable of suppressing the vortex street, and three different physical structures of the wake were detected. Stability analysis of the linearised Navier-Stokes equations was then performed on the three-dimensional flows to investigate the role of the spanwise modulation on the absolute instability associated with the von Kárman street.

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Gabriele Rocco
Imperial College London

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